



Queensland University of Technology
Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

[Sawang, Sukanlaya](#) & Unsworth, Kerrie L. (2011) Why adopt now? Multiple case studies and survey studies comparing small, medium and large firms. *Technovation*, 31(10-11), pp. 554-559.

This file was downloaded from: <http://eprints.qut.edu.au/45713/>

© Copyright 2011 Elsevier

Notice: *Changes introduced as a result of publishing processes such as copy-editing and formatting may not be reflected in this document. For a definitive version of this work, please refer to the published source:*

<http://dx.doi.org/10.1016/j.technovation.2011.06.002>

Why adopt now? Multiple case studies and survey studies comparing small, medium and large firms

Sukanlaya Sawang ^{a,*}, Kerrie L. Unsworth ^b

^a QUT Business School, Queensland University of Technology, Brisbane, QLD 4001, Australia

^b UWA Business School, The University of Western Australia, Crawley, WA 6009, Australia

Abstract

While a number of factors have been highlighted in the innovation adoption literature, little is known about whether different factors are related to innovation adoption in differently-sized firms. We used preliminary case studies of small, medium and large firms to ground our hypotheses, which were then tested using a survey of 94 firms. We found that external stakeholder pressure and non-financial readiness were related to innovation adoption in SMEs; but that for large firms, adoption was related to the opportunity to innovate. It may be that the difficulties of adopting innovations, including both the financial cost and the effort involved, are too great for SMEs to overcome unless there is either a compelling need (external pressure) or enough in-house capability (non-financial readiness). This suggests that SMEs are more likely to have innovation “pushed” onto them while large firms are more likely to “pull” innovations when they have the opportunity.

Keywords:

Innovation, Adoption, Stakeholders, External pressure, Organizational readiness, Organizational attitude, SMEs

1. Introduction

Most managers know that in order to survive, their organizations have to constantly improve their way of doing business (Teece, 2010). Organizational theorists and managers alike have long shown an interest in the adoption of innovation in organizations, primarily because of the essential role innovation plays in securing sustained competitive advantage (Diffusion of Innovation Theory, Porter, 2005). This interest in innovation adoption has occurred in both small and large firms, yet few studies have directly compared the factors that are more powerful for differently-sized organizations. For instance, it could be a case that small firms will less likely to adopt innovation due to financial cost and the effort involved unless there is either a compelling need (external pressure) or enough in-house capability (non-financial readiness). While we know that organizational size affects innovation adoption (Damanpour, 2010; Chen & Fu, 2001; Fernandes, Raja, & Whalley, 2006; Oh, Cruickshank, & Anderson, 2009; Shefer & Frenkel, 2005), we have less information about the different factors that may be involved in small, medium and large firms. Furthermore, while there is a growing body of literature examining small and medium enterprises (SMEs) (e.g. Chen & Fu, 2001; Elfenbein, Hamilton & Zenger, 2010; Fernandes, et al., 2006; Oh, et al., 2009; Shefer & Frenkel, 2005), very few studies have used the same methods to investigate both SMEs and large organizations – this is particularly important given Camison-Zornoza and colleagues' (2004) meta-analytic findings that different research methods and operationalizations led to different results and conclusions regarding the effect of size on innovation adoption. It is important, therefore, that we examine the factors affecting both SMEs and large firms in the same study. We conducted a preliminary case study with three organizations (one small, one medium and one large) to help ground our hypotheses before testing them with an organizational level survey of 94 firms.

1.1. The definition of innovation as used in this study

Innovation is a widely discussed topic and has been studied in a variety of contexts, including business, information technology, engineering, and policy development. As a result, there are many and varied definitions of innovation to be found in the literature. The most commonly cited definition of innovation from an organizational perspective is given by Zaltman et al. (1973) who wrote “An innovation is an idea, practice, or material artefact perceived to be new by the relevant adoption unit.” This is similar to Luecke and Katz (2003), who wrote "Innovation . . . is generally understood as the introduction of a new thing or method . . . Innovation is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services." To further refine our definition, we use Damanpour's (1991) differentiation of product and process innovations. Product innovations are new products or services introduced to meet a customer or market need, while process innovations are new elements, materials, task specifications, work and information flow mechanisms, or equipment used to produce a product or render a service. In our interview study, we focus on process innovation adoption as we found that these occurred in both SMEs and large firms. For our survey study, we examine both product and process innovations.

2. Factors affecting adoption

Previous research in innovation adoption identifies many factors which influence organizations to adopt new ideas, products, technologies or services. Among them are: top management support and innovation champions (Bayo-Moriones & Lera-López, 2007; Bruque & Moyano, 2007; Kelley & Lee, 2010), attitude toward innovation (Lippert & Volkmar, 2007), competitive advantages (Gambardella & McGahan, 2010; Tan, Chen, & Liu, 2006) and innovation characteristics (Peneder, 2010; Tornatzky & Klein, 1982). These previous studies demonstrate that innovation adoption is influenced by a complex dynamic of

multiple factors. Recently, Unsworth and colleagues (Unsworth, Sawang, Murray, Norman, & Sorbello, in press; Unsworth, Sawang, Murray, & Sorbello, 2009) developed a theoretical framework to categorize these multiple factors. Building on the innovation adoption literature (e.g. Bruque & Moyano, 2007; Chan & Mills, 2002; Gopalakrishnan & Damanpour, 1997; Naranjo-Gil, 2009) which have separated environmental (e.g. market demands) and organizational (e.g. strategy) factors, they propose that there are three proximal, organizational antecedents to innovation adoption: orientation (including both attitudes to innovation and attitudes toward risk-taking), pressure to adopt (similar to subjective norms), and readiness (similar to resources availability). They also suggest that other environmental and organizational factors affect these three.

There is a large body of evidence to suggest that factors within these categories affect innovation adoption (see Unsworth, et al., in press). However these studies have not differentiated between small, medium and large companies and at most have simply controlled for size. Therefore, we still do not know whether they apply equally well to differently-sized firms. To overcome this a little, we can look to the SME literature to find factors that affect SMEs in particular. For instance, Choi (2000) found that environmental factors, such as environmental uncertainty, competition and IT intensity, are important for innovation adoption among SMEs in Korea. Copus et al. (2008) examined innovation capabilities among SMEs in six European Union members and found that social and institutional capital were important factors for innovation performance. Malecki and Poehling (1999) demonstrated strong evidence that customers, suppliers and other firms are the most versatile source of ideas for SMEs, while a recent study of Danish firms also revealed that 80% to 90% of firms have close contacts with customers and suppliers for their new product development (Lund, 2004). As can be seen, there are a wide variety of factors even within this literature.

However, as noted above, different research measures appear to give rise to different findings (Camisón-Zornoza, et al., 2004). We found only a few studies that directly compared SMEs with large firms. Kim and An (2004) found that innovation adoption in large Korean companies was affected by attitudes of usefulness only, while in small Korean companies it was affected by the strategy and the industry environment, as well as usefulness. While the study did not look at organizational-level innovation adoption per se, Chen and Fu (2001) found that SMEs in China were heavily influenced by the market (a form of external pressure) while large firms in China were influenced by firm size.

Because of this lack of clarity within the literature, we first conducted a preliminary set of case studies with which to ground our hypotheses. We will now discuss the findings from these three case studies in relation to the literature before moving on to our quantitative test of these hypotheses.

3. Lessons learned from preliminary case studies: Hypotheses for differential antecedents of innovation adoption

To develop our hypotheses we first conducted exploratory comparative case studies (Yin, 2003) guided by the following research question: “*What factors influence a firm’s decision to adopt innovation?*” Twenty one semi-structured interviews were conducted at three manufacturing firms which represented small (*Firm A*), medium (*Firm B*) and large (*Firm C*) sizes to investigate if there were different adoption patterns between them. At the beginning of the interview, we asked key respondents to identify a current adopted innovation and provided them with our definition of innovation as outlined earlier. For subsequent interview questions, we clearly mentioned the name of the adopted innovation (ISO9001, Six Sigma, or 3i, respectively) during the interview to ensure that respondents related their answer toward the same innovation. The interview questions can be found in Appendix B.

We also used multiple sources of data to triangulate the information gained from the interviews (Eisenhardt, 1989). In each firm, we conducted four or more primary interviews with two top management representatives and two or more middle managers and employees. We supplemented these primary interviews with documents, including meeting memos, organizational charts and internal reports.

3.1 Effect of orientation on innovation adoption

Previous research has shown that positive attitudes towards the innovation – that is perceiving benefits in innovating – results in greater innovation adoption (see Mehrrens, Cragg, & Mills, 2001; Oh, et al., 2009; Yu & Tao, 2009). In our cases we too found that senior management, as well as employees, had a positive attitude toward their innovation. For example:

“It’s good to keep your quality tracking by using the ISO 9001” (Small Firm, senior management)

“We have been aware of Six Sigma in terms of a broader management, a business management process being used to identify business improvement opportunities and to directly link them to the marketplace and cost reduction within a business organization” (Medium Firm, senior management)

“I think it [3i] is vitally, vitally important to the success of a business.” (Large Firm, senior management)

While these statements clearly acknowledged the perceived benefit of the innovation, it seems that the attitude did not directly drive each firm’s decision to adopt innovation. For instance, *Firm B* knew about Six Sigma and had positive attitudes towards it for six years before finally adopting it. Instead, these preliminary cases indicated that attitudes were all

positive and therefore were not a driving force for innovation adoption; we therefore made no hypothesis regarding the relationship between orientation and innovation adoption for either SMEs or large firms.

3.2 Effect of pressure on innovation adoption

A perceived pressure to adopt an innovation can be exerted by a significant other within or external to the organization; this pressure is derived from an organizational belief (and willingness to comply) that the significant other feels that innovation adoption is appropriate and beneficial. Previous research shows that customer voices, suppliers, competitors and networks can all influence the organizational decision to adopt an innovation (e.g. Iacovou, Benbasat, & Dexter, 1995; Min & Galle, 2003).

In our preliminary cases, and similar to Chen and Fu (2001), we found that external pressure was very important in innovation adoption in both the small and medium firms. Customer requirement was a major push for *Firm A* to adopt ISO9001; managers there realized that although it was not an effortless task to implement the ISO9001 the firm must adopt it as a part of the customer's requirement in order to get into the business. Similarly, the adoption decision of *Firm B* appears to have been driven by its business partner:

"I guess we've been aware of Six Sigma for a number of years. But in recent years we became informed by our joint venture partner, Hop Group [a pseudonym], that they were implementing Six Sigma in a fairly significant way throughout their organization as part of their long term strategy for cost reduction and business performance improvement. So we decided that we would move down the Six Sigma path" (Medium Firm, managing director)

The finding underlines the importance of mimetic isomorphism explaining that *Firm B* sought to emulate the successful business partner to boost its performance. This could also

imply that *Firm B*'s business partner acted as the innovation champion that moved the firm to adopt Six Sigma. Nevertheless, we did not find any effect of external pressure in our large firm case, *Firm C*. Given these preliminary results we hypothesize that:

Hypothesis 1: Pressure will be positively and significantly associated with innovation adoption for SMEs but not for large firms.

3.3 Effect of organizational readiness for innovation adoption

There are many who suggest that organizational readiness is important to adopting innovation. At one level, this can simply mean financial slack to be able to adopt the innovation (e.g., Nohria & Gulati, 1996; Nystrom, Ramamurthy, & Wilson, 2002); however at another level, research has also pointed to non-financial resources that may aid innovation adoption. For example, Snyder-Halpern (2001) proposed seven sub-dimensions of readiness that could potentially affect the adoption of information technology: knowledge readiness, staffing readiness, technical readiness, operational readiness, process readiness, resources readiness, and value and goal readiness. Similarly, Mehrtens et al. (2001) found that organizational readiness (the level of knowledge, technical skills and experience with the internet) predicted internet adoption among SMEs, and Robertson et al. (2008) found that a key role for Technology Diffusion Agencies was in helping organizations to become ready for innovations.

In our studies, financial slack and readiness emerged as issues, particularly for the small firm, but neither one stopped any of the case firms from adopting the innovation. *Firm A* mentioned that its financial budget was relatively tight for introducing the ISO9001 and that the firm did not have any employees who were experienced in the ISO accreditation process. Nonetheless, the firm reallocated a budget supporting the ISO training for key managers and aimed to get accreditation. Similarly, both *Firm B*'s and *Firm C*'s senior

managers realized that although they did not have abundant resources, implementing these innovations (Six Sigma and 3i) was crucial to increasing their financial return. As a result, senior management committed to the adoption by reallocating the budgets to support the implementation. For example, *Firm B* included a financial controller as a part of the steering committee while *Firm C* allocated a budget to reward participation.

Therefore, it appears as though while readiness issues may be relevant for less important innovation adoptions, for key innovations they will not play a role in the adoption decision for either SMEs or large firms. In our cases we may have happened to sample key innovations, however this might not be the case for a larger survey. As such, we follow the literature and suggest that, particularly for SMEs, slack and readiness will be associated with greater innovation adoption.

Hypothesis 2: Financial slack and non-financial readiness will be positively and significantly associated with greater innovation adoption for SMEs but to a lesser extent for large firms.

3.4 Effect of environmental factors on innovation adoption

The industrial environment plays an obvious role in affecting innovation adoption. Not only does it apply pressure to firms to adopt (see section 3.2 above), but it also can affect the degree to which innovations are available and/or needed. Indeed, research has shown that environmental uncertainty and complexity (Baldridge & Burnham, 1975; F. Damanpour, 1996) and level of competition (Baldwin & Lin, 2002; Meyer & Goes, 1988; Nohria & Gulati, 1996; Salavou, Baltas, & Lioukas, 2004) are important in determining innovation adoption.

Interestingly, little direct evidence for the effects of the environment emerged from any of the three cases that we studied. The most direct evidence for this came from *Firm C*. Firm C perceived a highly competitive environment: “...*The automotive market is very busy...*”, and “...*it’s a fairly competitive market...*”, so they reacted with speed and aggressiveness: “...*you are driven by your vision to actually be competitive and to be aggressive and act with speed...*”. As a result, the firm aimed to be a highly innovative firm: “...*We have not really yet fully exhausted the opportunities we have for bringing those products [new product line] into our organization...*” and “...*If you don’t innovate you don’t survive....*”. Although the evidence is somewhat tentative, we proffer the following hypothesis to be tested:

Hypothesis 3: The industrial environment (competitiveness, dynamism and opportunity to innovate) will be significantly associated with innovation adoption for large firms but not for SMEs.

Our preliminary case study allowed us to at least confirm that orientation, pressure and readiness influence innovation adoption differentially among differently-sized firms and enabled us to develop hypotheses. To test these hypotheses, a survey study was performed.

4. Method

4.1 Sample

As part of a larger study on innovation adoption, we recruited organizations from multiple sources minimizing the sample homogeneity. First, we recruited organizations, predominantly small to medium sized firms, from a large technology diffusion and training agency database. Secondly, we randomly selected organizations from the Australian Business Register databases. We screened out organizations that no longer operated, and the

final list comprised 864 Australian firms. The survey package was mailed directly to the Managing Director of each firm. The reminder letters were mailed out after two weeks of the initial survey. In total, 134 firms returned the survey, providing a 16.1% response rate. While this response rate is low, it is typical for this type of survey (Cycyota & Harrison, 2006). Unfortunately, some of the data required to test our hypotheses was missing in some of the surveys, reducing our effective sample size to 94 firms.

The majority of respondents were in the manufacturing industry (55%). Based on the definition by the Australian Bureau of Statistics, our sample was relatively balanced across small (32%, less than 20 employees), medium (48%, less than 200 employees) and large organizations (20%, greater than 200 employees). Because most literature suggests that small and medium companies are affected by the same factors, we combined these two categories into one to increase our power, leaving us with two groups: small and medium firms ($n = 56$), and large firms ($n = 38$). Forty-two percent of the surveyed firms had gross revenue up to \$AUD5 million and 40% of firms were less than \$AUD50 million. Firms reported that they implemented changes to the existing product (66%) or business services (48%), new process/working design systems (54%), new organizational restructures (45%) and new HR systems (43%).

4.2 Survey instruments

The measures that we included into this study were adopted from existing literature, using five-point Likert scale, unless stated otherwise.

General attitude toward innovation was defined as an organizations' overall attitude toward innovation (Unsworth, et al., forthcoming). An example item included "*Our organization has a good understanding of why innovation is important for the business*" The cronbach alpha for our study was .86.

Financial slack refers to the financial allocation within the company (Klein, Conn, & Sorra, 2001). The four items were used and sample items were “*Money is readily available to pay for special projects in the organization*” and “*This organization can’t afford to spend money on anything but essentials*” (reverse-scored). Cronbach alpha for our study was .70.

Non-financial readiness examines non-financial resources i.e. human resource (P.C. Nystrom, K. Ramamurthy, & A.L. Wilson, 2002) and technical knowledge (Iacovou, et al., 1995) for innovation adoption. Example items included “*There is usually abundant availability of required labor skills within our organizations for introducing innovation*” and “*We have existing hardware and software to support innovation*”. Cronbach alpha for our study was .89.

Pressures from external stakeholders examined the perceived pressure from customers, suppliers, competitors, government departments, technology diffusion agencies, and universities to engage or not to engage in innovation adoption. Based on the Theory of Planned Behavior (Ajzen and Fishbein, 1980), this measure was comprised of two elements – the degree to which the external stakeholder supports innovation adoption, and the degree to which the organization values the opinion of that stakeholder. The respondents were asked, “*To what extent do you believe that [the external stakeholder] think you should introduce innovations into your organization?*” (underline included in the survey), while the second asked “*To what extent do you value the opinions of [the external stakeholder] in relation to introducing innovation in your organization*” (underline included in the survey). The two sets of items were then multiplied for each stakeholder to obtain measures of perceived pressure from each type of stakeholder. Cronbach alpha for our study was .89.

Industry environment was measured using three variables: competitiveness (“*What is the intensity in your industry?*”), using a five-point response scale ranging from “None” to

“Very High”); industry dynamism (“*How quickly do new technological developments arise in your environment?*”), using a five-point response scale ranging from “None” to “Very Quickly”); and opportunity to innovate (“*What is the rate of innovation adoption in your industry?*”), using a five-point response scale ranging from “None” to “Very Fast”).

Innovation adoption refers to product and process innovations that the firm introduced in the last three years. The innovations which have been used in this study were changes in product, changes in business services, new work processes, new organizational structures, and new HR systems/processes. To increase the validity of the response we asked the respondent a series of questions about the innovation such as the name of the innovation and the category to which it belonged.

5. Results

To control for any other effects of size, we included firm size as a control variable in the regressions. Furthermore, to ensure that there were no other differences between our sample of SMEs and large firms that might affect the results through range restriction or confounding we compared the two groups on a number of factors. There were no significant differences between SMEs and large firms on number of innovations adopted ($t = .18$, n.s.), type of innovation adopted ($t = .26$, n.s.), attitude towards innovation ($t = -1.16$, n.s.), attitude towards risk-taking ($t = -.24$, n.s.), non-financial readiness ($t = .14$, n.s.), external pressure ($t = .52$, n.s.), financial slack ($t = -.99$, n.s.), competition ($t = -1.58$, n.s.), industry dynamism ($t = 1.89$, n.s.), opportunity to innovate ($t = 1.92$, n.s.), or formalization of organizational procedures ($t = .67$, n.s.). The only significant differences that we found were on the organizational structure, i.e. the level of specialization (large firms were more specialized than SMEs; $t = -6.13$, $p < .001$) and centralization (large firms were more centralized than SMEs; $t = -2.36$, $p < .05$). However only specialization was related to innovation adoption ($r =$

.32, $p < .05$; $r = .09$, n.s.; respectively), therefore specialization was included in the following analyses as a control variable.

First, the correlation coefficients among the variables were examined for both SMEs and large firms (see Table 1). For our SME sample, innovation adoption was significantly correlated with attitudes towards innovation ($r = .26$, $p < .05$), non-financial readiness ($r = .15$, $p < .05$), external pressure ($r = .34$, $p < .01$), organizational size ($r = .25$, $p < .05$), specialized structure ($r = .36$, $p < .01$) and opportunity to innovate ($r = .28$, $p < .05$). In comparison, innovation adoption in our large firm sample was correlated only with organizational size ($r = .35$, $p < .05$), specialized structure ($r = .33$, $p < .05$) and the dynamism of the industry ($r = .29$, $p < .05$).

 Insert Table 1 about here

To test our proposed hypotheses, multiple regressions were used with a one-tailed test due to small sample size and directional hypotheses. The results in Table 2 demonstrate that 39% of variance in innovation adoption in SMEs and 40% of variance in innovation adoption in large firms could be explained by the model. However, as we expected (and with the exception of organizational size), different factors were significantly associated with innovation adoption in the differently-sized firms.

 Insert Table 2 about here

For SMEs, organizational size, non-financial readiness ($\beta = .22$) and external pressure ($\beta = .27$) were significantly associated with innovation adoption. On the other hand, for large firms it was predominantly the environmental factors which were significantly associated with innovation adoption; namely, organizational size ($\beta = .20$), industry dynamism ($\beta = .51$), and opportunity to innovate ($\beta = .33$). Similar to our case study findings, attitudes towards innovation were not significantly associated with innovation adoption for either SMEs or large firms. Looking to our hypotheses we see that external pressure is significantly associated with innovation adoption for SMEs while it was not significantly associated with innovation adoption for large firms providing support for Hypothesis 1. Similarly, in line with Hypothesis 2, non-financial readiness was associated with innovation adoption for SMEs but not large firms, however financial slack was not associated with innovation adoption for either small or large firms; thus, Hypothesis 2 is partially supported. Hypothesis 3 was partially supported as the industrial environment (dynamism and opportunity to innovate, but not level of competitiveness) influenced innovation adoption within large firms.

6. Discussion

This study was designed to examine the differential effects of factors on differently-sized firms. In both the case study and the survey we found that innovation adoption in SMEs was related to factors that were different to those found to affect adoption in large firms. In particular, we found that external pressure and non-financial readiness were associated with innovation adoption for SMEs but not for large firms, but that the environmental factors of industry dynamism and opportunity to innovate were associated with innovation adoption for large firms but not for SMEs.

From our research it appears as though innovation adoption in SMEs is particularly affected by the people around them and the skills and knowledge of the people within them.

Although not all SMEs are entrepreneurial ventures, there is a great deal of entrepreneurship research which also highlights the importance of these issues. It may be that the difficulties of adopting innovations, including both the financial cost and the effort involved, are too great for SMEs to overcome unless there is either a compelling need (external pressure) or enough in-house capability (non-financial readiness).

On the other hand, it appears that in our sample, innovation adoption in large firms was more dependent upon the availability of innovations in the environment. Organizational constraints, such as financial slack or non-financial readiness, were not important in adoption – what mattered was the opportunity to innovate and the dynamism of the sector. This suggests that large firms are more likely to pull innovations in, while SMEs are more likely to have innovations pushed on to them.

The non-significant relationship between general attitude and innovation adoption may seem surprising at first, but it is supported by others who have concluded that attitude is not the most important factor predicting adoption behavior (Oskamp, 1977; Weinstein, 1972). Undoubtedly, many researchers have attempted to extend an adoption model beyond the relationship between attitude and behavior by considering a variety of environmental characteristics that may facilitate an adoption behavior (Ada, 2003; Berkhout & Rowlands, 2007; Cooper, 1998).

This study has a number of limitations that should be noted. Firstly, we conducted three cases (as our preliminary study) where each case represented each firm category (small, medium and large). Generalizability may be limited, therefore multi-case design should be used for future research. Nonetheless, our study attempted to conduct multiple interviews and captured most management levels from each organization. Further, we also compensate this limitation by collecting information from various sources (interviews, attending

meetings, memo and organizational reports/documents). This triangulation approach can improve our reliability and validity of our findings. Secondly, while the survey research used in our study helped to complement our qualitative findings, the relatively limited sample size prohibited us from performing more rigorous tests of association such as structural equation modeling. Future research can adopt our survey in a larger sample size, and then the full structural model can be examined. Additionally, future research may consider a cross cultural examination in order to confirm if the same triggers would apply to firms outside Australia.

7. Implications and conclusion

The practical implications of the study for practitioners and innovating organizations are clear. We have shown that size matters: the factors that are related to innovation adoption in SMEs are not the same as those in large firms. Obviously, for practitioners there is a need to acknowledge the different contexts in which adoption occurs to help SMEs and large firms in the most appropriate way. From a theoretical perspective, we believe we have helped to further our understanding of innovation adoption by looking a little more closely at how innovation adoption operates in differently-sized firms. While most studies have either looked at all organizations without differentiation or have looked only at SMEs, we propose that it is important to use the same methods and operationalizations to compare differently-sized companies. It would be interesting in future research to see if the process of innovation differed between SMEs and large firms and whether these differences continued into the implementation phase as well.

To conclude, our study used both case studies and surveys of SMEs and large organizations to determine the factors associated with innovation adoption for each. While this takes us only a small way forward in understanding the different aspects of innovation

adoption in differently-sized firms, we believe it is an important step and one which we hope will lead to many others.

Acknowledgement

This research was supported by The Australian Research Council (Grant no. LP 0455129).

References

- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Ada, S. (2003). The adoption of Internet commerce by SMEs in the south of Italy: An environmental, technological and organizational perspective. *Journal of Global Information Technology Management*, 6(1), 52-72.
- Baldrige, J. V., & Burnham, R. A. (1975). Organizational innovation: Individual, organizational and environmental impacts. *Administrative Science Quarterly*, 20, 165-176.
- Baldwin, J., & Lin, Z. (2002). Impediments to advanced technology adoption for Canadian manufacturers. *Research policy*, 31(1), 1-18.
- Bayo-Moriones, A., & Lera-López, F. (2007). A firm-level analysis of determinants of ICT adoption in Spain. *Technovation*, 27(6-7), 352-366.
- Berkhout, T., & Rowlands, I. H. (2007). The voluntary adoption of green electricity by Ontario-based companies: The Importance of Organizational Values and Organizational Context. *Organization & Environment*, 20(3), 281-303.
- Bruque, S., & Moyano, J. (2007). Organisational determinants of information technology adoption and implementation in SMEs: The case of family and cooperative firms. *Technovation*, 27(5), 241-253.
- Camisón-Zornoza, C., Lapiedra-Alcamí, R., Segarra-Ciprés, M., & Boronat-Navarro, M. (2004). A meta-analysis of innovation and organizational size. *Organization Studies*, 25(3), 331-361.
- Chan, P. Y. P., & Mills, A. M. (2002). Motivators and inhibitors of e-commerce technology adoption: Online stock trading by small brokerage firms in New Zealand. *Journal of Information Technology Case and Application Research*, 3, 38-56.

- Chen, X. D., & Fu, L. S. (2001). IT adoption in manufacturing industries: differences by company size and industrial sectors -- the case of Chinese mechanical industries. *Technovation*, 21(10), 649-660.
- Choi, S. H. (2000). *Study on factors affecting the utilization of EC in SMEs*. Unpublished Master Thesis, Hankuk University of Foreign Studies, Korea.
- Cooper, J. R. (1998). A multidimensional approach to the adoption of innovation. *Management Decision*, 36(8), 493-502.
- Copus, A., Skuras, D., & Tseggenidi, K. (2008). Innovation and Peripherality: An Empirical Comparative Study of SMEs in Six European Union Member Countries. [Article]. *Economic Geography*, 84(1), 51-82.
- Cycyota, C. S., & Harrison, D. A. (2006). What (not) to expect when surveying executives: A meta-analysis of top manager response rates and techniques over time. *Organizational Research Methods*, 9(2), 133-160.
- Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of management Journal*, 34(3), 555-590.
- Damanpour, F. (1996). Organizational complexity and innovation: Developing and testing multiple contingency models. *Management Science*, 42(5), 693-716.
- Damanpour, F.(2010). An Integration of Research Findings of Effects of Firm Size and Market Competition on Product and Process Innovations Product and Process Innovations. *British Journal of Management*, 21 (4), 996-1010
- Eisenhardt, K. M. (1989). Building theories from case study research *The Academy of Management Review*, 14(4), 532-550.
- Elfenbein, D.W., Hamilton, B.H., Zenger, T.R. (2010). The Small Firm Effect and the Entrepreneurial Spawning of Scientists and Engineers. *Management Science*, 56 (4), 659-681

- Fernandes, K. J., Raja, V., & Whalley, A. (2006). Lessons from implementing the balanced scorecard in a small and medium size manufacturing organization. *Technovation*, 26(5-6), 623-634.
- Gambardella, A., & McGahan, A. M. (2010). Business model innovation: General purpose technologies and their implications for industry structure. *Long Range Planning*, 43: 262-271
- Gopalakrishnan, S., & Damanpour, F. (1997). A review of innovation research in economics, sociology and technology management. *Omega*, 25(1), 15-28.
- Iacovou, C. L., Benbasat, I., & Dexter, A. S. (1995). Electronic data interchange and small organizations: Adoption and impact of technology. *Management Information Systems Quarterly*, 19, 465-485.
- Kelley, D. & Lee, H. (2010). Managing Innovation Champions: The Impact of Project Characteristics on the Direct Manager Role. *The Journal of Product Innovation Management*, 27(7), 1007-1019.
- Kim, Y. D., & An, C. G. (2004). An empirical analysis on the performance of e-trade by the utilization level of international commercial enterprises. *Korea Academy of International Business*, 15(1), 53-78.
- Klein, K. J., Conn, A. B., & Sorra, J. S. (2001). Implementing computerized technology: An organization analysis. *Journal of Applied Psychology*, 86(5), 811-824.
- Lippert, S. K., & Volkmar, J. A. (2007). Cultural Effects on Technology Performance and Utilization: A Comparison of U.S. and Canadian Users. *Journal of Global Information Management*, 15(2), 56-90.
- Luecke, R., & Katz, R. (2003). *Managing Creativity and Innovation*: Boston, MA: Harvard Business School Press.

- Lund, R. (2004). The Managed Interaction between Innovation and Learning and a Complementary Perspective,. In J. Christensen & B. A. Lundvall (Eds.), *Product innovation, interactive learning and economic performance* (pp. 69-98). Amsterdam: Elsevier.
- Malecki, E. J., & Poehling, R. M. (1999). Extroverts and introverts: small manufacturers and their information sources. *Entrepreneurship and Regional Development*, 11(3), 247-268.
- Mehrtens, J., Cragg, P. B., & Mills, A. M. (2001). A model of internet adoption by SMEs. *Information & Management*, 39(3), 165-176.
- Meyer, A. D., & Goes, J. B. (1988). Organizational assimilation of innovations: A multilevel contextual analysis. *Academy of Management Journal*, 31(4), 897-923.
- Min, H., & Galle, W. P. (2003). E-Purchasing: Profiles of Adopters and Non-Adopters. *Industrial Marketing Management*, 32(2), 227-233.
- Naranjo-Gil, D. (2009). The influence of environmental and organizational factors on innovation adoptions: Consequences for performance in public sector organizations. *Technovation*, 29(12), 810-818.
- Nohria, N., & Gulati, R. (1996). Is slack good or bad for innovation? *Academy of Management Journal*, 39(5), 1245-1264.
- Nystrom, P. C., Ramamurthy, K., & Wilson, A. L. (2002). Organizational context, climate and innovativeness: Adoption of imaging technology. *Journal of Engineering and Technology Management*, 19(3-4), 221-247.
- Nystrom, P. C., Ramamurthy, K., & Wilson, A. L. (2002). Organizational context, climate and innovativeness: Adoption of imaging technology. *Journal of Engineering and Technology Management*, 19(3,4), 221.

- Oh, K. Y., Cruickshank, D., & Anderson, A. R. (2009). The adoption of e-trade innovations by Korean small and medium sized firms. *Technovation*, 29(2), 110-121.
- Oskamp, S. (1977). *Attitudes and Opinions*. Englewood Cliffs, NJ: Prentice-Hall.
- Peneder, M. (2010). Technological regimes and the variety of innovation behaviour: creating integrated taxonomies of firms and sectors. *Research Policy*, 39(3), 323–334
- Porter, B. E., Sr. (2005). Time and implementing change. *British Journal of Educational Technology*, 36(6), 1063-1065.
- Robertson, J., Sorbello, T., & Unsworth, K. L. (2008). Innovation implementation: The role of technology diffusion agencies. *Journal of Technology Management Innovation*, 3(3), 1-10.
- Salavou, H., Baltas, G., & Lioukas, S. (2004). Organisational innovation in SMEs: The importance of strategic orientation and competitive structure. *European Journal of Marketing*, 38(9/10), 1091-1112.
- Shefer, D., & Frenkel, A. (2005). R&D, firm size and innovation: an empirical analysis. *Technovation*, 25(1), 25-32.
- Snyder-Halpern, R. (2001). Indicators of organizational readiness for clinical information technology/systems innovation: A Delphi study. *International Journal of Medical Informatics*, 63, 179-204.
- Tan, Z., Chen, H., & Liu, X. (2006). Adoption of low mobility services: "Little-Smart" in China as a case. *Info : the Journal of Policy, Regulation and Strategy for Telecommunications, Information and Media*, 8(6), 69-78.
- Teece, DJ (2010). Business models, business strategy and innovation. *Long Range Planning*, 43 (2-3), 172-194

- Tornatzky, L. G., & Klein, K. J. (1982). Innovation Characteristics and innovation adoption-implementation: A meta analysis of findings. *IEEE Transactions on Engineering Management*, 29(1), 28-45.
- Unsworth, K. L., Sawang, S., Murray, J., Norman, P., & Sorbello, T. (in press). Understanding innovation adoption: Effects of orientation, pressure and control on adoption intentions. *International Journal of Innovation Management*. doi:10.1142/S1363919611003593.
- Weinstein, A. G. (1972). Predicting Behavior From Attitudes. *The Public Opinion Quarterly*, 36(3), 355-360.
- Yin, R. K. (2003). *Case study reseach: Design and methods*. Thousand Oaks, CA: Sage Publications, Inc.
- Yu, C.-S., & Tao, Y.-H. (2009). Understanding business-level innovation technology adoption. *Technovation*, 29(2), 92-109.
- Zaltman, G., Duncan, R., & Holbeck, J. (1973). *Innovations and organizations*: New York: Wiley.

Table 1**Correlation coefficients among the variables for small to medium firms and large firms (in brackets)**

Variable	2	3	4	5	6	7	8	9	10
1. Firm size	.28* (.65***)	.19 (-.24)	-.02 (.18)	-.15 (.21)	-.02 (.10)	-.21 (-.01)	-.14 (-.02)	-.04 (-.15)	.25* (.35*)
2. Specialized structure		.13 (-.17)	.02 (.22)	.01 (.37*)	.01 (.11)	.11 (-.09)	-.07 (.18)	-.04 (-.07)	.36** (.33*)
3. Attitude toward innovation			.02 (.08)	.19 (.06)	.32* (.17)	.14 (.06)	.12 (.11)	.27* (.21)	.26* (.01)
4. Financial resources				.16 (.28***)	.14 (-.13)	-.24* (-.08)	.11 (.09)	.17 (-.14)	.12 (.17)
5. Non financial resources					.46*** (.08)	-.13 (-.10)	.34** (.45***)	.38*** (.04)	.34** (.15*)
6. External pressures						-.07 (.10)	.17 (.10)	.10 (.23)	.34** (.00)
7. Industry competitiveness							-.13 (.12)	-.23* (.19)	-.10 (.09)
8. Industry dynamism								.24* (.24)	-.00 (.29*)
9. Opportunity to innovate									.28* (.15)
10. Innovation adoption									

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2**Summary of Regression Analyses comparing between small to medium firms and large firms**

Var	iables	Small to medium firms			Large firms		
		B	SE B	β	B	E B S	β
Model 1							
Constant		.91	.67		1.28	.79	
	Specialized structure	.52	.22	.31*	.22	.28	.16
	Firm size	.54	.41	.17	.19	.20	.20*
Model 2							
	Constant -1	.34	1.70		-5.72	2.53	
	Specialized structure	.44	.20	.26*	.24	.28	.17
	Firm size	.79	.40	.25	.33	.19	.34
	Industry competitiveness	-.25	.21	-.14	.09	.30	.04
	Industry dynamism	-.04	.29	-.02	1.05	.35	.51**
	Opportunity to innovate	.70	.56	.16	3.09	1.53	.33*
	Attitude toward innovation	.07	.32	.02	.15	.43	.05
	Financial resources	.12	.21	.06	.32	.31	.17
	Non financial resources	.37	.22	.22*	-.41	.36	-.21
	External pressures	.01	.01	.27*	-.01	.01	-.14

Note: * $p < .05$, ** $p < .01$